SMART INDIA HACKATHON 2025

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TITLE PAGE

- **Problem Statement ID – 25068**
- **Problem Statement Title – Real time Groundwater resource evaluation using DWLR**
- **Theme – Miscellaneous**
- **PS Category – Software**
- **Team ID – 68016**
- **Team Name – GROUNDBREAKERS**

GROUND BREAKERS

IDEA / TITLE

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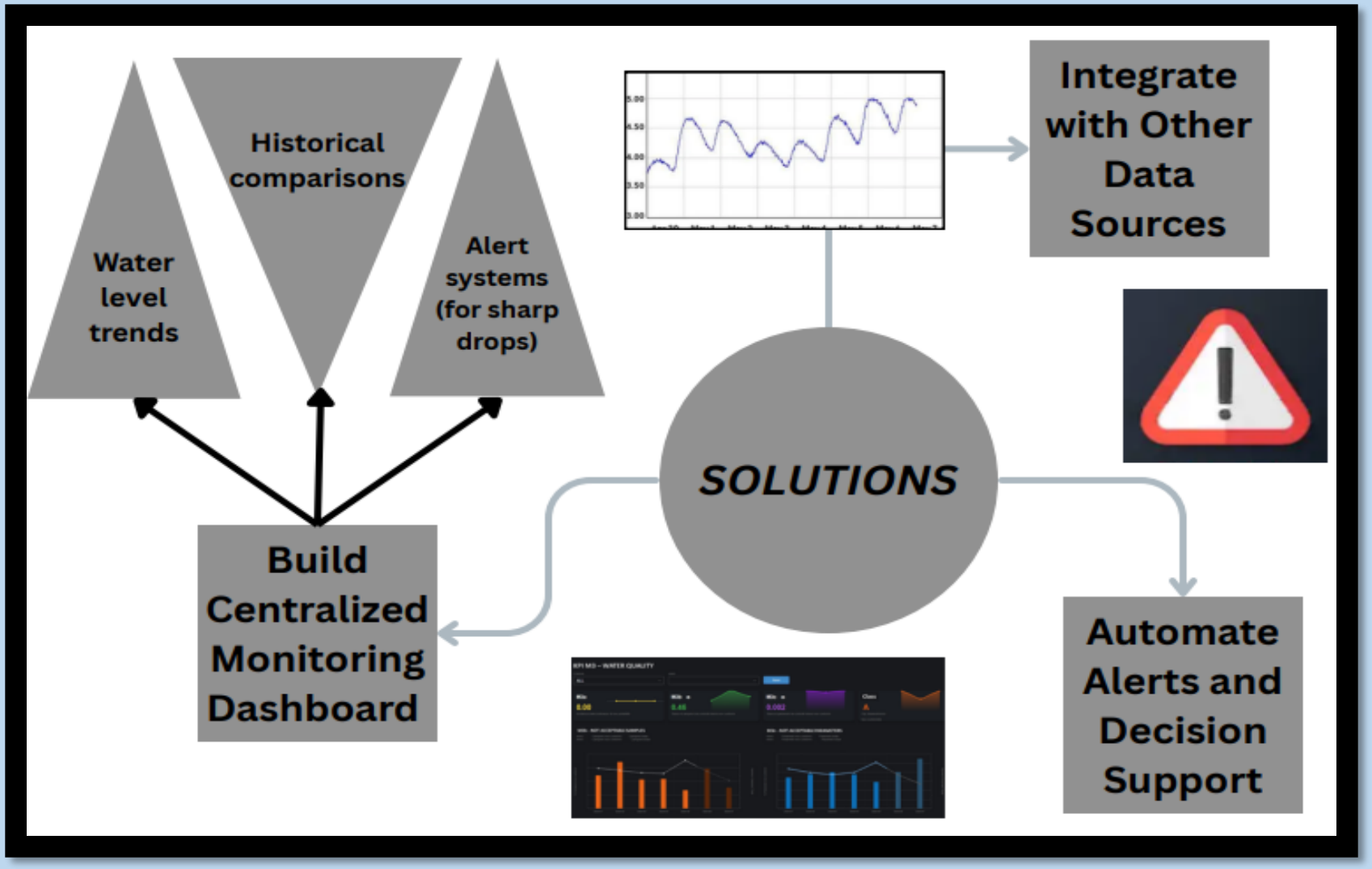
DWLR (Digital Water Level Recorder) is used to measure the level of ground water and surface water continuously on a real-time basis.



PROBLEMS:-

- Groundwater Depletion Crisis
- Climate Change & Unpredictable Rainfall
- Lack of Standardized Groundwater Monitoring

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TECHNICAL APPROACH

- Local Language support → Supporting rural communities by providing assistance in local languages such as Hindi, Tamil, and others.
- Alert and notification system
- •Real-time water level graphs •Hints•Geo-mapping of well locations •Custom alerts (SMS, email) for critical levels •viewtrends (daily/weekly/monthly)
- Tech Stack → Frontend: React native / Flutter; Backend: Firebase, Firestore; Database: Firestore
- AI/ML Integration → Forecasting future water levels based on trends + rainfall. Models :- Tensorflow lite, Random Forest (for predictions).

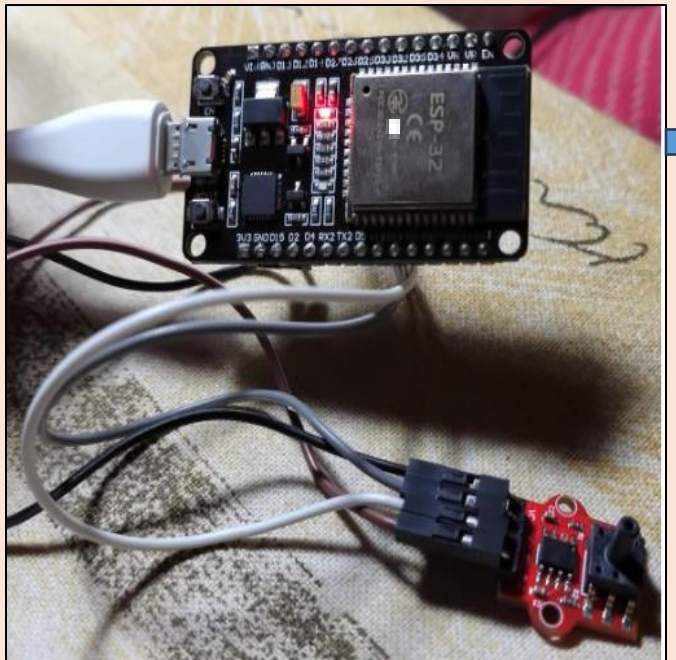
HARDWARE :-

ESP 32 – Microcontroller chip designed for embedded & IoT Hardware projects.

HX710B - High-Resolution Analog-to-Digital Conversion & Pressure Measurements.

JUMPING WIRE – Links Sensors to Microcontrollers.

POWERSENSORS - Sends Data to Microcontrollers (like ESP32/Arduino).



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FEASIBILITY & VIABILITY

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TECHSTACK-

- Flutter
- Firebase Fire Google Maps API for geo location
- Rule-based alerts
- Lightweight ML (with Tensor Flow Lite)

TEAM CAPABILITY - Each member has defined tasks → frontend, backend, data handling, ML exploration.

DATA AVAILABILITY - Using open datasets like Data.gov.in and Kaggle → free, accessible Fire store stores data efficiently → scalable and real-time.

TIME CONSTRAINTS - A basic working prototype can be built in 1 week. No heavy algorithms needed, focusses on features and presentation.

USER BENEFIT - Helps water resource managers track groundwater levels. Provides alerts to prevent overuse or depletion Enables planning during droughts or floods.

COST-EFFECTIVENESS - Uses free tools like Firebase (within limits) Open data → no licensing cost Minimal hardware → runs on any smartphone

SCALABILITY - Designed for easy expansion → more data, more users. Cloud infrastructure allows growth without downtime ML integration can be added later as the dataset grows

SUSTAINABILITY - Promotes responsible water usage Alerts reduce waste and encourage conservation practices. Future enhancements can integrate AI-driven insights and be made available in local languages for more user friendly approach.

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RESEARCH AND REFERENCES

- https://404shubhnotfound.github.io/Real-time-Groundwater-evaluation/grwm.html
- https://www.downtoearth.org.in/water/digital-water-information-system-for-efficient-sustainable-management-83621#:~:text=Structured%20data%20sets%20are%20required,parameters%20and%20other%20related%20topics
- https://earthobservatory.nasa.gov/images/91008/groundwater-gains-in-india#:~:text=shows%20groundwater%20trends%20across%20India,are%20where%20losses%20were%20detected
- https://share.google/feirhDbLLidDIybQL
- https://share.google/3deOvug5AgsnDHjmg
- https://indiawris.gov.in/wris/#/

LOCAL FEEDBACK AND DOMAIN INPUTS :-

- ✓ Farmers & Local Communities
- ✓ State Groundwater Departments
- ✓ Panchayats / Local Administrative Bodies
- ✓ NGOs / Water Conservation Organizations